

A Semantic Study of Coordinate Compounds in Chinese

Yingdi Jiang^{1,2}, Yonglian Yu³ and Zhiying Liu^{*1,2}

¹Institute of Chinese Information Processing, Beijing Normal University

²UltraPower-BNU Joint Laboratory for Artificial Intelligence, Beijing Normal University

³Institute of Advanced Study of the Humanities and Religion, Beijing Normal University
Beijing, China

{de, yvonne21}@mail.bnu.edu.cn, liuzhy@bnu.edu.cn

Abstract

The coordinate compound is an indispensable part of Chinese. We divide the compound words into three types. They are synonymous compounds, related compounds and opposite compounds. Based on the previous researches, we use the method of word embedding to study them from diachronic and synchronic perspectives. First of all, the formation time, the process and result of semantic changes of these three kinds of compound words have been discussed. Then from the synchronic perspective, this paper studies the usage and characteristics of three kinds of compound words in modern Chinese.

1 Introduction

Coordinate compound plays an important part in modern Chinese. It has gone through a long historical development process from monosyllabic words to phrases to coordinate compounds, and then it was finally fixed in the form of words. Ma (1983) put the Coordinate Compounds into “Pianlie” (并列). At present, the definition of coordinate compound is that a word composed of two identical, similar, related, or opposite roots (Huang and Liao, 2002).

From the perspective of meaning, scholars in linguistics have different views on the

classification of coordinate compounds. Ma (1983) and Hu (1995) thought that coordinate compounds should be divided into two categories. They are synonym and antonym. Li (2007) and Xiang (1993) preferred to three kinds, they are synonymy, related word and antonym, while Xing (2015) thought that dividing them into synonymy, related word, antonym and partial word would be better. Moreover, Ren (1981) inherited the view of Xing and then divided related word into related morpheme and distant morpheme.

In this paper, we tend to divide the coordinate compounds into three types. They are synonymous compounds, related compounds and opposite compounds.

(1) The first type is synonymous compound. It refers to compound words composed of two synonymous or near-synonymous morphemes. Under these circumstances, the meanings of the two morphemes A and B may not be exactly the same, or they each have multiple meanings.

e.g. 阿荣的面庞愈发显得白皙、娇艳。
(《生为女人》)

A Rong’s face is more and more white and beautiful. (*Born as a woman*)

In *Shuo Wen Jie Zi*, “bai” was interpreted as “Western color”. When a funeral was held, everything must be white. “Skin white” was indicated as “xi” (皙). While in the *Modern Chinese Dictionary*, “bai and xi” (白皙) means the skin color of somebody is very white.

(2) The second one is related compound. It is a combination of two meaning-related morphemes.

Therefore, the meanings of the two morphemes A and B are completely irrelevant. They belong to the same category.

e.g. 民为贵，社稷次之，君为轻。（《孟子》）

The people are most important, the country is second, the king is light. (*Meng Zi*)

“She” (社) is the god of earth, and “ji” (稷) is the god of the cereal. But the two combined “she and ji” (社稷) means the whole country.

(3) The last one is the opposite compound. It is a combination of two morphemes of opposite meanings. The meanings of the two morphemes A and B are opposite. To a certain extent, whether a word belongs to a related compound or an opposite compound is confusing.

e.g. 我们的得失，是直接同板门店的谈判桌联系着的。（《东方》）

Our gains and losses are directly linked to the negotiating table of the Panmunjom store. (*Dong Fang*)

The meaning of “de” (得) is gain and the meaning of “shi” (失) is loss. “De and shi” (得失) means the combination of gain and loss.

According to the classification of coordinate compounds, we can roughly summarize the semantic changes of compound words AB as these points in Table 1. The specific situation will be introduced in the fourth part of this paper.

Compounds	Combining form	Example
synonymous compounds	$AB \approx A \approx B \approx A + B$	ya and chi (牙齿)
	$AB = A$ (if $A < B$)	bai and xi (白皙)
	$AB = B$ (if $A > B$)	
related compounds	$AB > A + B$	red and green (丹青)
	$AB = C$	bone and meat (骨肉)
opposite compounds	$AB = A/B$	death and life (死活)
	$AB \approx A + B$	reward and punishment (赏罚)
	$AB = C$	morning and evening (旦夕)

Table 1: Combined form of coordinate compounds

In this paper, we plan to explore the semantic changes of coordinate compounds from the diachronic and synchronic perspectives. From the diachronic point of view, we will study the formation time, the way semantics change, and the process of semantic changes of these three types of compound words. In addition, from the synchronic point of view, we will explore the use of three

types of compound words in modern Chinese and their similarities and differences.

2 Related Work

The formation of coordinate compounds had a long history and this kind of word formation had strong ability to produce words. It was not noticed until the emergence of *Ma's Grammar*. So far, the research on coordinate compounds had been carried out from many angles, and the research results were very rich.

On the one hand, many studies were based on ancient Chinese studies and most of them did researches on the use of words in a book. According to Du (2005), from the four aspects of the relationship between morpheme meaning and morpheme meaning, the relationship between morpheme meaning and word meaning, the source of word meaning and the distribution of part of speech, the structure types of compound words in *Mo Zi* were investigated. Xie and Mao (2006) studied the synonymous compounds in *Song Shu*. Li (2009) explored coordinate compounds in *Mencius* from the surface structure to the internal semantics. Li (2012) analyzed the grammatical structure and semantic types of coordinate compounds in *Shui Hu Zhuan* from a quantitative perspective.

On the other hand, many researches had been done on modern Chinese. Hao (2004) did the exhaustive analysis of all coordinate compounds in Modern Chinese Dictionary. Han (2008) studied the idiom ratio of the “lianwen” (连文), “duiwen” (对文) phenomenon and the reasons for the idioms. Wang (2011) explored the structure, morpheme order, transformation and parallel mechanism of the parallel two-syllable compounds. Luo (2012) discussed the surplus phenomenon of coordinate compounds in modern Chinese.

Except for Chinese, some studies also discussed other languages. Hu (1986) studied the composition and semantic features of the compound words in modern Tibetan language. Quan (1990) revealed the characteristics and similarities of Chinese and Korean compound nouns in terms of their historical origins.

3 Method

Word embedding is widely used in the field of deep learning. In addition, Word embedding can represent word features and have good semantic characteristics. It is able to distribute the different syntactic and semantic features of a word to each dimension. According to the word embedding, we can calculate the semantic similarity between words. For example, Table 2 lists the 10 words that are most similar to the meaning of “jiannan” (艰难) in the *People’s Daily corpus*.

We study coordinate compounds from diachronic and synchronic perspectives. From a diachronic point of view, the corpus is divided into eight periods, which are the Pre-Qin Period, Han-Wei-Jin-Northern and Southern Dynasties, Tang Dynasty, Song Dynasty, Yuan Dynasty, Ming Dynasty, Qing Dynasty and Modern Chinese (*People’s Daily*). Moreover, from a synchronic perspective, the corpus consists of three parts: *People’s Daily* (an official newspaper of China), Zhihu (a Chinese question answering website), Sina Weibo (a social media platform launched by Sina).

Related Word	Semantic Similarity
hardships(艰辛)	0.7614
difficult(艰困)	0.7450
endless(漫长)	0.7333
hard(艰苦)	0.7242
perilous(艰险)	0.7204
rough(坎坷)	0.6886
difficulties and dangers(艰危)	0.6705
arduous and tortuous(艰难曲折)	0.6618
distress(困厄)	0.6604
dangerous(凶险)	0.6553

Table 2: The related words of “jiannan” (艰难)

4 Diachronic Study

We divide the coordinate compounds into three categories, which are synonymous compounds, related compounds, and opposite compounds. Most of them can be classified clearly, but there are also cases where the synonymous compounds and the opposite compounds overlap. For example, “hand and foot” (手足), some scholars attribute it to synonymous compounds, and other scholars classify it as an opposite compound. In this paper, we have selected some representative words, using word embedding to study the semantic changes of

these words. From a diachronic perspective, each type of words has their own changing characteristics.

4.1 Synonymous Compounds

There are two kinds of semantic variations of synonymous compounds. One is $AB \approx A \approx B \approx A + B$. The morphemes A and B have the same meaning, so the meaning of compound word AB is the combination of their respective meaning. But when A and B are polysemy, the meaning of AB is a high-level summary of their shared meanings. The other is $AB = A$ (if $A < B$) or $AB = B$ (if $A > B$). In this case, the semantic range of one of morphemes A and B is much larger than the other one. That is to say, they may have a top-down relationship. We have listed the semantic similarity of synonymous compounds in Table 3.

(1) $AB \approx A \approx B \approx A + B$

The meaning of A and B in “ya and chi” (牙齿), “zhui and zhu”(追逐), “ben and zou”(奔走) are almost the same. For example, both “ya”(牙) and “chi”(齿) means teeth in modern Chinese and “zhui”(追) and “zhu”(逐) have the same meaning of running.

From the eight periods in Table 3, we can find the semantics of AB are sometimes closer to A, sometimes closer to B, and not point to one side all the time. The reason is that A and B have the same meaning when they are used as monosyllabic words, so there is no difference between a compound word pointing to A or B.

(2) $AB = A$ (if $A < B$) or $AB = B$ (if $A > B$)

When the semantic scope of A and B is different, the meaning of AB always points to the party with a small semantic range.

As is shown in the table 3, the synonymous compounds, for example, “qi and xie” (器械), “jiang and tu” (疆土). The semantic scope of “qi” (器) and “tu” (土) is far greater than that of “xie” (械) and “tu”(土). All utensils can be called “qi” (器), while “xie” (械) mainly refers to weapon and tool. The word formation time of “qi and xie” (器械) and “jiang and tu” (疆土) could date back to the Pre-Qin period.

4.2 Related Compounds

Compared with its constituents A and B, the semantic variant of related compound AB has two

Combined form	Word		Period							
	Synonymous compounds	Constituent	the Pre-Qin Period (先秦)	Han-Wei-Jin-Northern and Southern Dynasties (汉魏晋南北朝)	Tang Dynasty (唐)	Song Dynasty (宋)	Yuan Dynasty (元)	Ming Dynasty (明)	Qing Dynasty (清)	People's Daily (1948 - 2017)
AB ≈ A ≈ B ≈ A + B	Ya and chi (牙齿)	"Ya" and "Chi"(牙和齿)	0.9521	0.8328	0.7911	0.1414	0.9219	0.4573	0.4852	0.4947
		"Ya and chi" and "Ya"(牙齿和牙)	/	/	0.8229	0.3314	/	0.5515	0.6995	0.4717
		"Ya and chi" and "Chi"(牙齿和齿)	/	/	0.7465	0.4459	/	0.7328	0.4532	0.4570
	Zhui and zhu (追逐)	"Zhui" and "Zhu"(追和逐)	0.9489	0.5491	0.6460	0.3747	0.7463	0.3159	0.2692	0.2346
		"Zhui and Zhu" and "Zhui"(追逐和追)	/	0.7127	0.3496	0.3478	0.7800	0.5544	0.6245	0.2742
		"Zhui and Zhu" and "Zhu"(追逐和逐)	/	0.7851	0.5471	0.6004	0.7652	0.7411	0.5268	0.1032
AB = A (if A < B) or AB = B (if A > B)	Qi and xie (器械)	"Qi" and "Xie"(器和械)	0.9133	0.8033	0.6344	0.2182	/	0.8138	0.7614	0.2357
		"Qi and xie" and "Qi"(器械和器)	0.9051	0.8231	0.6461	0.0862	0.7598	0.5790	0.2139	0.1427
		"Qi and xie" and "Xie"(器械和械)	0.9767	0.8057	0.9083	0.5247	/	0.5759	0.2834	0.1958
	Jiang and tu (疆土)	"Jiang" and "Tu"(疆和土)	0.9176	0.8128	0.6613	0.3127	/	0.5171	0.4019	0.2731
		"Jiang and tu" and "Jiang"(疆土和疆)	0.9571	0.9025	0.7244	0.6983	/	0.6466	0.5452	0.2779
		"Jiang and tu" and "Tu"(疆土和土)	0.9446	0.7491	0.5877	0.5765	0.6874	0.7588	0.3312	0.0093

Table 3: Semantic similarity of synonymous compounds

Combined form	Related compounds	Word		Period							
		Constituent	the Pre-Qin Period (先秦)	Han-Wei-Jin-Northern and Southern Dynasties (汉魏晋南北朝)	Tang Dynasty (唐)	Song Dynasty (宋)	Yuan Dynasty (元)	Ming Dynasty (明)	Qing Dynasty (清)	People's Daily (1948 - 2017)	
AB > A + B	Spring and autumn (春秋)	"Spring" and "Autumn"(春和秋)	0.8695	0.9462	0.9112	0.7535	0.7649	0.9462	0.8787	0.8807	
		"Spring and autumn" and "Spring"(春秋和春)	0.0597	0.2219	0.2965	0.1033	0.5806	0.5853	0.0656	0.4377	
		"Spring and autumn" and "Autumn"(春和秋)	0.1473	0.1672	0.2399	0.0240	0.5292	0.5805	-0.0189	0.4128	
	Red and green (丹青)	"Red" and "Green"(丹和青)	0.9233	0.8167	0.8036	0.5027	0.6114	0.4151	0.5774	0.3714	
		"Red and green" and "Green"(丹青和丹)	/	0.5355	0.5579	0.3649	0.7183	0.6961	0.7228	0.3442	
		"Red and green" and "Green"(丹青和青)	/	0.6144	0.5237	0.4218	0.6941	0.6029	0.4195	0.3209	
AB = C	Earth God and Cereal God (社稷)	"Earth God" and "Cereal God"(社和稷)	0.8924	0.9004	0.7163	0.5917	/	0.8485	0.6254	0.1398	
		"Earth God and Cereal God" and "Earth God"(社稷和社)	0.4537	0.5058	0.6742	0.1920	0.7009	0.2901	0.1737	-0.1327	
		"Earth God and Cereal God" and "Cereal God"(社稷和稷)	0.1296	0.4401	0.6689	0.4378	/	0.5640	0.5696	0.4794	
	Bone and meat (骨肉)	"Earth God and Cereal God" and "Country"(社稷和国家)	0.8835	0.9473	0.7476	0.7661	0.7076	0.9164	0.7513	0.0622	
		"Bone" and "Meat"(骨和肉)	0.9553	0.8852	0.7005	0.7382	0.8243	0.6291	0.5876	0.5099	
		"Bone and meat" and "Bone"(骨肉和骨)	0.7987	0.7790	0.7714	0.3225	0.7820	0.5398	0.4730	0.2587	
		"Bone and meat" and "Meat"(骨肉和肉)	0.8174	0.7918	0.6663	0.3646	0.5799	0.2629	0.1503	0.2550	
		"Bone and meat" and ("Family" or "Brothers") (骨肉和(子女/手足))	0.8905	0.8838	0.8229	0.6931	0.8372	0.7457	0.6813	0.7612	
		Scoop and liquor (斟酌)	"Scoop" and "Liquor"(斟和酌)	0.9041	0.8546	0.6165	0.7083	0.8099	0.6047	0.5821	0.5288
	"Scoop and Liquor" and "Scoop"(斟酌和斟)		/	0.8433	0.8743	0.2867	0.5845	0.2580	0.2232	0.1440	
	"Scoop and Liquor" and "Liquor"(斟酌和酌)		/	0.9485	0.5254	0.5671	0.7493	0.6686	0.3861	0.3906	
		"Scoop and Liquor" and ("Balance" or "Consider") (斟酌和(权衡/思量))	/	0.9410	0.8687	0.7387	0.5756	0.7209	0.5370	0.7443	

Table 4: Semantic similarity of related compounds

tendencies. One is $AB > A + B$. A and B represent the same kind of things, but the semantic range of compound word AB is much larger than that of A and B alone. The other is $AB=C$. That is to say this compound word AB has a new meaning C on the basis of A and B.

(1) $AB > A + B$

As is shown in the Table 4, “spring” (春) and “autumn” (秋) are two seasons, but the combination of them is the general term for the four seasons including summer and winter. “Red” (丹) and “green” (青) are all ores that can be used as pigment. While the combination of “red and green” (丹青) can not only represent beautiful colors including red and green, it also refers to the painting art.

At this point, the semantic similarity between compound word AB and A or B is not high, while the semantic similarity between A and B is the highest. The main reason is that A and B belong to the same category, so they appear similarly in the text.

(2) $AB=C$

“Earth God and Cereal God” (社稷) refers to country. But “Earth God” (社) and “Cereal God” (稷) represent the figures of Chinese legends, namely the gods of the earth and the gods of the cereal. The similar words are “bone and meat” (骨肉), “scoop and liquor” (斟酌), etc. The semantics of the related words after combination are independent of A and B, but they have a new meaning on the basis of original meaning.

Combined form	Opposite compounds	Word Constituent	Period							
			the Pre-Qin Period (先秦)	Han-Wei-Jin-Northern and Southern Dynasties (汉魏晋南北朝)	Tang Dynasty (唐)	Song Dynasty (宋)	Yuan Dynasty (元)	Ming Dynasty (明)	Qing Dynasty (清)	People's Daily (1948 - 2017)
AB = A/B	Good and bad (好歹)	"Good" and "Bad"(好和歹)	/	/	/	/	0.5045	0.3794	0.2202	0.0918
		"Good and bad" and "Good"(好歹和好)	/	/	/	/	0.4208	0.4769	0.2906	0.1919
		"Good and bad" and "Bad"(好歹和歹)	/	/	/	/	0.6596	0.5047	0.3239	0.4289
	Forget and remember (忘记)	"Forget" and "Remember"(忘和记)	0.1177	-0.3082	0.3158	0.1059	0.2575	0.2621	0.2987	0.3453
		"Forget and remember" and "Forget"(忘记和忘)	/	/	/	0.3842	0.6396	0.5534	0.6791	0.7529
		"Forget and remember" and "Remember"(忘记和记)	/	/	/	0.2088	0.2746	0.4098	0.3232	0.2280
AB ≈ A + B	Have and not have (有无)	"Have" and "Not have"(有和无)	0.7474	0.5776	0.3479	0.2295	0.6635	0.2874	0.3278	0.5183
		"Have and not have" and "Have"(有和无有)	0.4985	0.3563	0.4028	0.2325	0.2301	0.1262	0.3400	/
		"Have and not have" and "Not have"(有和无无)	0.5686	0.3563	0.4869	0.3675	0.2408	0.3547	0.3815	/
	First and after (先后)	"First" and "After"(先和后)	0.8976	0.5048	0.5654	0.2416	0.4806	0.5261	0.3571	0.1702
		"First and after" and "First"(先后和先)	0.6960	0.7755	0.6348	0.1205	0.2978	0.0794	0.0456	-0.0359
		"First and after" and "After"(先后和后)	0.6866	0.4343	0.4093	0.1656	0.3527	0.2678	0.2193	0.2860
	Reward and punishment (赏罚)	"Reward" and "Punishment"(赏和罚)	0.9692	0.9064	0.6065	0.6139	0.4922	0.6398	0.7391	0.3347
		"Reward and punishment" and "Reward"(赏罚和赏)	0.9377	0.8876	0.5380	0.4338	0.4624	0.4021	0.1465	0.3276
		"Reward and punishment" and "Punishment"(赏罚和罚)	0.9674	0.9105	0.9100	0.4994	0.6250	0.6253	0.3376	0.5071
AB = C	Morning and evening (旦夕)	"Morning" and "Evening"(旦和夕)	0.9209	0.8990	0.7272	0.4887	-0.0731	0.8014	0.6033	0.3591
		"Morning and evening" and "Morning"(旦夕和旦)	/	0.7444	0.7926	0.3910	0.0506	0.5862	0.6781	0.2021
		"Morning and evening" and "Evening"(旦夕和夕)	/	0.7633	0.6749	0.2771	0.8479	0.3748	0.3869	0.3541
		"Morning and evening" and ("Time" or "Short") (旦夕和(时间/短))	/	0.8840	0.8073	0.2773	0.8190	0.1902	0.1074	0.1279
	Female and male (雌雄)	"Female" and "Male"(雌和雄)	0.9586	0.7719	0.7294	0.4988	0.8115	0.7236	0.3132	0.6985
		"Female and male" and "Female"(雌雄和雌)	0.8985	0.8080	0.8289	0.5721	0.7192	0.6606	0.6658	0.7841
		"Female and male" and "Male"(雌雄和雄)	0.8766	0.8116	0.6681	0.3824	0.8857	0.6620	0.4365	0.6445
	"Female and male" and ("Victory or defeat" or "High and lower") (雌雄和(胜负/高下))	/	0.9392	0.7635	0.4674	0.8607	0.7496	0.5845	0.5951	

Table 5: Semantic similarity of opposite compounds

Therefore, from a diachronic point of view, the meaning of related compounds is closer to their new meaning after combination in vector space.

4.3 Opposite Compounds

Compared with the synonymous compounds and the related compounds, the situation of the opposite compounds are much more complicated. From the Table 5, we can find there are three types of the semantic change. The first one is $AB = A/B$. It means the meaning of the opposite compound word AB only points to one of A and B, and the meaning of the other morpheme disappears. The second one is $AB \approx A + B$. The combination of the meanings of A and B is roughly equivalent to the meaning of compound words. The third one is $AB = C$. The meaning of compound word is the extended meaning or metaphorical meaning of the original word, which gives rise to a new meaning on the basis of the original word.

(1) $AB = A/B$

Let's look at the first one. The appearance time of "good and bad" (好歹), "forget and remember" (忘记) was not earlier than other opposite compounds. Their semantics point to "bad" (歹) and "forget"(忘), besides the meaning of the other morpheme of AB disappeared, which was

consistent with the development trend of semantic similarity calculated from word embedding. Moreover, from the ancient Chinese to the modern Chinese, this directionality may become more obvious. For example, the semantic similarity between "forget and remember" (忘记) and "forget" (忘) was 0.3842 in Song dynasty, while in modern Chinese it reaches 0.7529.

(2) $AB \approx A + B$

The second one is $AB \approx A + B$. The distance between compound word AB and A in vector space is almost the same as that of B. This kind of words is similar to the related compounds, such as "spring and autumn" (春秋), "red and green" (丹青). The difference is that the semantic similarity between the related compound AB and A or B is higher, while the semantic similarity between A and B in the opposite compounds is not high. It is because that the meaning of opposite compounds is the combination of A and B, for example, "reward and punishment" (赏罚) points to "reward" (赏) and "punishment"(罚) at the same time. But A and B are not tightly combined and can be used separately in modern Chinese.

(3) $AB = C$

The third type is $AB = C$. The opposite compound of this kind is similar to "Earth God and

Cereal God” (社稷), “scoop and liquor” (斟酌) of related compounds. They are semantically similar to the new meaning, which comes with the help of extensions, metaphors, etc. For example, “victory or defeat” (胜负) and “high and lower” (高下) are the new meaning of “female and male” (雌雄) in Chinese, and the semantic similarity of “female and male” (雌雄) is closer to that of “victory or defeat” (胜负) and “high and lower” (高下). When $AB = C$, the new meaning and the old meaning of the opposite compounds are used simultaneously, while the related compounds mainly use the old meaning. In this way, the stability of the opposite compounds which points to new meanings is not as high as that of related compounds.

5 Synchronic study

Based on the *People's Daily*, Zhihu and Sina Weibo, we study the usage of compound words in modern Chinese from the perspective of synchronicity. There are two characteristics:

As for “wen and zi” (文字), which is one of the synonymous compounds, the semantic similarity of “wen” (文) and “zi” (字), “wen and zi” (文字) and “wen” (文) and “wen and zi” (文字) and “zi” (字) in *People's Daily* is lower than those in Zhihu and Sina Weibo (Table 6). What is the reason for this? As we all know, *People's Daily* is the official news web and Zhihu is a question and answer website. Most of the words in *People's Daily corpus* are just like written language, while those in Zhihu are more colloquial. Besides, as the biggest social networking site in China, most of the young people chat on the Sina and talk about the entertainment news. Therefore, Sina Weibo’s spoken words are more intense. Because of this, the vocabulary used by people in Sina Weibo and Zhihu is less than that in *People's Daily*.

The compound words like “jiang and tu” (疆土), “red and green” (丹青) and “earth god and cereal god” (社稷) are difficult to compare their semantic similarities. This is because many coordinate compounds are more like ancient Chinese. Although they still have vitality in written language, they are rarely used in everyday spoken language. What’s more, as new words come into being, they are gradually replaced by other words.

Compound words	Constituent	People's Daily	Zhihu	Sina Weibo
Wen and zi (文字)	"Wen" and "Zi"(文字和字)	0.4437	0.9506	0.6648
	"Wen and zi" and "Wen"(文字和文)	0.3162	0.9126	0.5831
	"Wen and zi" and "Zi"(文字和字)	0.3660	0.9353	0.9651

Table 6: The semantic similarity of “wen and zi” (文字)

6 Conclusions

The coordinate compounds are studied by using word embedding, and we can get the following conclusions.

Firstly, the lexicalization of coordinate compounds began very early, and many words were used together in the pre-Qin period.

Secondly, in a certain sense, there are some similarities in the semantic change process of related and opposite compounds, but the change of opposite compounds is more complicated.

Thirdly, from a diachronic perspective, the semantic similarity between compound words and their components has been declining with the development of time. The reason is that the words have strong ability to produce words, and new words which are similar to compound words in meaning are constantly being generated.

Fourth, from a synchronic perspective, some coordinate compounds are similar to those in ancient Chinese. So they are no longer used in modern Chinese, especially in the corpus of Sina weibo, Zhihu and other spoken languages.

Acknowledgments

This work is supported by National Language Committee Research Program of China (No. ZD1135-42), Research and Development of Question Answering for Intelligent Robots (230200001) and China Scholarship Council.

Zhiying Liu is the corresponding author. (E-mail: liuzhy@bnu.edu.cn)

References

- Du W. 2005. Research on the Coordinate Compounds in *Mo Zi*. Hebei Normal University.
- Han L. 2008. “Lian Wen”, “Dui Wen” and Coordinate Compounds in Modern Chinese. *Anhui Literature Monthly*, (11):300.

- Hao R. 2004. A Study of Coordinate Compounds in Modern Chinese. Beijing Normal University.
- Hu T. 1986. Some Characteristics of Tibetan Coordinate Compounds. *Minority Languages of China*, (6):13-19.
- Hu Y. 1995. Modern Chinese. Shanghai Education Publishing Press. Shanghai, PRC.
- Huang B. Liao X. 2002. Modern Chinese (Third Edition). Higher Education Press. Beijing, PRC.
- Li J. 2007. New Chinese Grammar. Hunan Education Press. Hunan, PRC.
- Li S. 2012. A Quantitative Study of Coordinate Compounds in *Shui Hu Zhuan*. Suzhou University.
- Li Z. 2009. A Study of Parallel Double Tone Compounds in *Meng Zi*. *Journal of Leshan Teachers College*, 24(4):62-65.
- Luo S. 2012. Cognitive Explanation of Redundancy in Coordinate Compounds of Modern Chinese. *Journal of Shanghai University*, 29(6):103-110.
- Ma J. 1983. Ma's Grammar. Commercial Press. Beijing, PRC.
- Quan B. 1990. On the Common Points of Chinese and Korean Coordinate Compound Nouns. *Minority Languages of China*, (6):71-73.
- Ren X. 1981. Chinese Word Formation. China Social Science Press. Beijing, PRC.
- Wang Y. 2011. A Study of Parallel Double Tone Compounds in Modern Chinese. Guangxi Normal University.
- Xiang X. 1993. Concise History of Chinese. Higher Education Press. Beijing, PRC.
- Xie F. Mao Y. 2006. A Study of Synonymous Compounds in *Song Shu*. *Journal of Chongqing University of Posts and Telecommunications*, 18(3):416-418.
- Xing F. 2015. Modern Chinese. Higher Education Press. Beijing, PRC.